

Liebert Process Fluid Chiller™

Technical Data Manual - 1.5 - 10 Tons, 50 & 60Hz



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THE LIEBERT PROCESS FLUID CHILLER

Water cooled electronic equipment has special needs beyond cool water. Sensitive equipment requires year-round operation, precise temperature-regulated water flow and a clean circulating loop—features only available with an equipment-matched, dedicated chiller. For best reliability, this chiller should be factory-tested and supported.

Liebert Process Fluid Chillers are matched to the application to provide the proper temperature and flow rate for a variety of sensitive electronic systems.

These dedicated chillers are tested at the factory to ensure proper operation and are supported by factory-trained experts with immediate access to common spare parts.

In addition, the Process Fluid Chiller is easy to install, requiring only final piping and wiring connections for proper operation.

Built-in quality, along with Liebert's leadership role in supporting critical electronic systems, make the Process Fluid Chiller the logical choice to support your water-cooled equipment.

The Process Fluid Chiller is available in capacities to accommodate a variety of sensitive equipment:

Medical

MRIs
CAT Scans
PET Scans
Linear Accelerators
CGR and RDS Cyclotron
Electron Microscopes
Gas Chromatograph
Cryogenic Compressors and other sensitive medical systems

Industrial

Injection Molding Machines
Vacuum Systems and Evaporators
Computers and Semiconductors
Water Jacketed Machinery
Plastics Molding and Extrusion
Metal Working and Plating
Chemical Processes
Laser Welding and Cutting
Distillation Processes
Vapor Degreasers
Power Supplies
Power Transformers
Air/Gas Compressors
Water cooled loads to 10 tons

Table 1 Model number breakdown

PS	036	A	P	B	3	0
PS = Process Chiller	Normal capacity in thousand BTUH	A = Air Cooled	A = 460 3-phase P = 208/230 1-phase Y = 20/230 3-phase	S = Stainless Steel Pump B = Gauge/Heater/SS Pump M = Multistage Pump (8/10 ton models) R = Gauge/Heater/Multistage Pump (8/10 ton models)	3 = Revision Level	0 = No Tank T = 100 gal. Tank

Standard Features

Frame and Panels

The unit base is heavy-gauge galvanized steel. The exterior panels are painted and provide a durable, weather-resistant finish.

Indoor or Outdoor Installation

The weatherproof panels and rugged components are durable for placement outdoors. Circulating fluid may be specified with propylene or ethylene glycol to adapt the unit to cold climates.

Compressor

The compressor is a fully hermetic, reciprocating design with overload protection. It has rubber isolated mounting to reduce noise and vibration. A liquid line sight glass/moisture indicator is included as well as a manual reset high-pressure switch. The high-efficiency scroll compressors are standard on 4-ton, 8-ton, and 10-ton models.

Refrigerant Dehydrator

The refrigerant dehydrator assures a moisture-free refrigerant system for extended component life.

Expansion Valve

The externally equalized thermostatic expansion valve smoothly controls refrigerant flow and provides precise control of superheat.

Refrigerant Receiver

The refrigerant receiver provides a liquid seal and storage of refrigerant when the system is operating in ambients from minus 30°F to plus 115°F (-34°C to +46°C). Performance will be reduced above 95°F ambient. Consult factory for derated capacities.

Stainless Steel Pump

To provide a non-ferrous circulating loop to protect sensitive electronics, a pump with a stainless steel housing and impeller is part of the design.

Fluid Pressure Relief Valve

The 3/4" (2 cm) FPT brass, high pressure relief valve is mounted

on the inlet pipe to the fluid reservoir expansion tank for safety protection against system pressures over 50 psi (345 kPa).

Fluid Reservoir Expansion Tank

The fluid reservoir expansion tank is manufactured of 14 gauge stainless steel, and provides thermal storage to act as a buffer for rapid load changes and to provide an area for fluid expansion. Expansion volume is one gallon (3.8 liters); maximum working pressure is 50 psi (345 kPa).

Refrigerant Pressure Relief Valve

A relief valve mounted on the receiver protects the refrigerant circuit from high pressure situations.

Control System

This module contains controls for fluid temperature, refrigerant low pressure switch, manual reset high pressure switch, low ambient start relay, compressor anti-recycle relay, transformer with circuit breaker and remote shutdown.

Factory-Installed Options

Refrigerant Gauges

For at-a-glance monitoring, suction and discharge refrigerant gauges with large dial faces are conveniently mounted on the unit exterior. These gauges are stainless steel for durability. (Sold only with tank heater).

Tank Heater

An optional copper sheath/stainless steel insertion heater maintains minimum fluid temperature during low ambient conditions. (Sold only with refrigerant gauges).

Multistage Pump (8 and 10-ton models)

This optional pump provides up to 200 ft (597 kPa) of head pressure at 15 gpm (57 lpm). See **Figure 9 - Process chiller pump performance—60Hz.**

Fluid Thermal Storage Tank

The insulated, stainless steel tank is built into a frame with panels, and is factory mounted and piped below the chiller cabinet. The tank is 50 gallons (190 liters) on 3-5 ton models, and 100 gallons (380 liters) on 8 and 10-ton models.

See drawings in "Dimensional Data" on page -6.

Optional System Accessories (Field-Installed)

Fluid Pressure Gauge

A 2 ½ inch (6.35 cm) analog gauge for monitoring supply or return pressure is available. The readout is dual scale: 0 to 100 PSI and 0 to 7 BAR.

Dial Thermometer

To provide supply or return fluid temperature measurement, a hermetically sealed dial thermometer is available. The externally adjustable, 2 ½ inch (6.35 cm) dial is scaled from 20 to 130°F (-6.7 to 54.4°C).

Check Valve

A brass, swing check valve is offered for installation in the chiller outlet piping to prevent backflow through the chiller.

Circuit Setter

This is a calibrated balancing valve that, when installed in the chiller outlet piping, provides for flow balance, flow metering and shut off of fluid flow.

Water Level Control and Alarm System

This module automatically adds water to the thermal storage reservoir when the water level drops below a preset level. It consists of an on/off switch, a 24 VAC control transformer protected by a circuit breaker, a flow regulating solenoid valve, a double check backflow preventer and time delay relays. The module also includes a prewired RCM4 monitor with local display and non-powered common alarm contracts.

Isolation Ball Valve

An available brass, ¼ turn isolation valve provides for isolation of fluid piping components in the event of a service necessity.

High Temperature Thermostat

A remote bulb, adjustable (40-90°F, 4.4-32°C) thermostat provides alarm contact when the fluid temperature rises above a design limit of system operation. (See Monitoring and Alarms section for RCM8 Monitoring System).

Low Flow Switch

A flow switch provides set point and alarm contact when fluid flow falls below a design limit of system operation. (See Monitoring and Alarms section for RCM8 Monitoring System.)

Wall-Mounted Monitoring Box

This unit includes supply and return ball valves (six total), a flowmeter, a water filter with bypass, pressure gauges (supply and return), temperature gauges (supply and return) and 3/4" barbed connections.

Emergency Water Switchover Module (for systems circulating water)

On a high fluid temperature alarm or loss of fluid flow alarm, this unit will automatically switch to emergency water. This redundant cooling source protects your critical equipment from potentially damaging high

temperatures or unplanned shutdown. See **WARNING** below.

RCM4 Four-Point Dry Contact Monitor is a four-point, normally open, dry contact monitoring panel. One Form C, dry contact common alarm relay output (rated at 24 VAC, 3 amp) is provided. The RCM4 requires 24 VAC or 24 VDC power source. Power supply is not included. Four red LEDs illuminate on alarm and the alarm buzzer is silenced by a front panel switch.

RCM8DO Eight-Point Dry Contact Monitor is an eight-point, dry contact input and eight dry contact output monitoring panel. It is identical to the RCM8CE, but with the addition of eight normally open relays (rated at 24 VAC or VDC, 1 amp) that will automatically energize upon alarm of each corresponding monitoring point.

RCM8CE Eight-Point Dry Contact Monitor is an eight-point, normally open or normally closed (individually selectable) dry contact monitoring panel that can be used:

- as a stand-alone panel.
- to dial out on alarm to a remote location or numeric/alphanumeric pager.
- to interface with Liebert SiteScan centralized monitoring systems.



WARNING

The emergency water source module is for use on systems that circulate water as the cooling medium. Using this option on a glycol system will dilute the glycol solution during emergency operation and could damage the environment as well as violate regulations for disposing of glycol solutions.

Technical Data

Table 2 Air-cooled data—60Hz

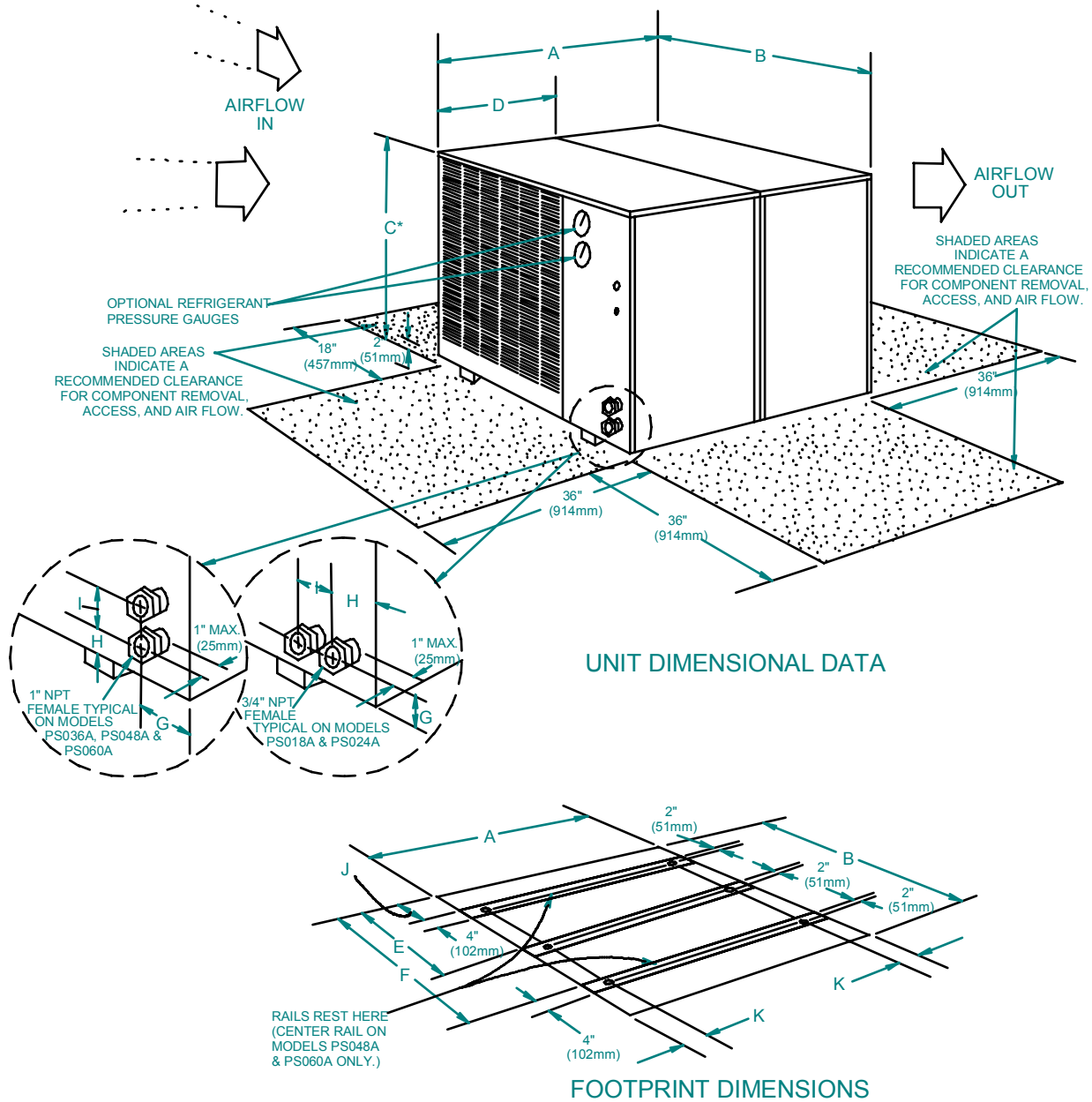
	PS018A	PS024A	PS036A	PS048A	PS060A	PS096A	PS120A
	1.5 Tons	2 Tons	3 Tons	4 Tons	5 Tons	8 Tons	10 Tons
Circulating Fluid—Water							
Coolant Flow Rate - GPM (L/M)	2.4 (9)	3.3 (12.6)	5.3 (19.8)	7.9 (29.4)	10.2 (38.4)	16 (60.6)	20 (75.8)
Pressure Drop - PSI (kPa)	5.9 (40.7)	11.1 (76.8)	5.1 (35.0)	8.1 (55.6)	13.3 (91.8)	8.1 (55.8)	13.2 (91.0)
Net Cooling Capacity—BTUH (kW)							
45°F (7.2°C) LWT	11800 (3.5)	17000 (5.0)	26600 (7.8)	39300 (11.5)	51200 (15.0)	77200 (22.6)	91600 (26.8)
50°F (10°C) LWT	13300 (3.9)	19400 (5.7)	29500 (8.6)	42500 (12.4)	57400 (16.8)	83600 (24.5)	102400 (30.0)
55°F (12.8°C) LWT	14800 (4.3)	21700 (6.4)	32600 (9.5)	45900 (13.4)	63500 (18.6)	90400 (26.5)	113000 (33.1)
60°F (15.6°C) LWT	16000 (4.7)	23900 (7.0)	35900 (10.5)	49700 (14.6)	69200 (20.3)	97600 (28.6)	122600 (35.9)
Std. Stainless Steel Pump-Hp(kW)	0.75 (0.55)	0.75 (0.55)	0.75 (0.55)	1.0 (0.75)	1.0 (0.75)	3.0 (2.2)	3.0 (2.2)
Total Head Pressure-PSI (kPa)	41.1 (282)	40.7 (279)	39.8 (273)	46.8 (321)	46.3 (318)	62.3 (429.6)	60.6 (417.8)
Water Connection Size in. (mm)	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)	1-1/4 (32)	1-1/4 (32)
Fluid Volume-Gal. (Liter)	7.1 (26.9)	7.2 (27.3)	9.8 (37.1)	9.9 (37.5)	10.0 (37.9)	12.0 (45.4)	13.0 (49.2)
Circulating Fluid—40% Ethylene Glycol							
Coolant Flow Rate -GPM (L/M)	2.4 (9)	3.3 (12.6)	5.3 (19.8)	7.9 (29.4)	10.2 (38.4)	16.0 (60.6)	20.0 (75.8)
Pressure Drop - PSI (kPa)	8.4 (58.0)	15.7 (108.2)	7.0 (48.1)	11.1 (76.2)	18.0 (124.3)	13.0 (89.6)	17.6 (121.4)
Net Cooling Capacity—BTUH (kW)							
45°F (7.2°C) LWT	10700 (3.1)	16600 (4.9)	23800 (7.0)	36300 (10.6)	47100 (13.8)	71200 (20.8)	84700 (24.8)
50°F (10°C) LWT	12200 (3.6)	18600 (5.4)	26600 (7.8)	39600 (11.6)	54200 (15.9)	77800 (22.8)	92600 (27.1)
55°F (12.8°C) LWT	13700 (4.0)	21500 (6.3)	29500 (8.6)	43100 (12.6)	59100 (17.3)	84800 (24.8)	104000 (30.5)
60°F (15.6°C) LWT	15200 (4.5)	23700 (6.9)	32500 (9.5)	48800 (14.3)	64000 (18.7)	96200 (28.2)	114000 (33.4)
Std. Stainless Steel Pump-Hp(kW)	0.75 (0.55)	0.75 (0.55)	0.75 (0.55)	1.0 (0.75)	1.0 (0.75)	3.0 (3.2)	3.0 (3.2)
Total Head Pressure-PSI (kPa)	41.1 (282)	40.7 (279)	39.8 (273)	46.8 (321)	46.3 (318)	62.3 (429.6)	60.6 (417.8)
Water Connection Size - in. (mm)	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)	1-1/4 (32)	1-1/4 (32)
Fluid Volume - Gal. (Liter)	7.1 (26.9)	7.2 (27.3)	9.8 (37.1)	9.9 (37.5)	10.0 (37.9)	12.0 (45.4)	13.0 (49.2)
Circulating Fluid—40% Propylene Glycol							
Coolant Flow Rate - GPM (L/M)	2.4 (9)	3.2 (12.6)	5.3 (19.8)	7.9 (29.4)	10.2 (38.4)	16.0 (60.6)	20.0 (75.8)
Pressure Drop - PSI (kPa)	10.4 (71.4)	19.2 (132.1)	8.5 (58.2)	13.2 (91.2)	21.4 (147.7)	13.4 (92.4)	20.5 (141.3)
Net Cooling Capacity—BTUH (kW)							
45°F (7.2°C) LWT	10200 (3.0)	15900 (4.7)	22400 (6.6)	34400 (10.1)	45000 (13.2)	67400 (19.7)	80600 (23.6)
50°F (10°C) LWT	11700 (3.4)	17900 (5.2)	25100 (7.4)	37900 (11.1)	49600 (14.5)	74400 (21.8)	88500 (25.9)
55°F (12.8°C) LWT	13100 (3.8)	19900 (5.8)	28100 (8.2)	41500 (12.2)	54200 (15.9)	81600 (23.9)	96800 (28.3)
60°F (15.6°C) LWT	14700 (4.3)	22000 (6.4)	31000 (9.1)	45100 (13.2)	59200 (17.3)	88800 (26.0)	105400 (30.9)
Std. Stainless Steel Pump-Hp(kW)	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)	1-1/4 (32)	1-1/4 (32)
Total Head Pressure - PSI (kPa)	41.1 (282)	40.7 (279)	39.8 (273)	46.8 (321)	46.3 (318)	62.3 (429.6)	60.6 (417.8)
Water Connection Size - in. (mm)	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)	1-1/4 (32)	1-1/4 (32)
Fluid Volume - Gal. (Liter)	7.1 (26.9)	7.2 (27.3)	9.8 (37.1)	9.9 (37.5)	10.0 (37.9)	12.0 (45.4)	13.0 (49.2)

Table 3 Air-cooled data—50Hz

	PS021A	PS028A	PS038A	PS047A	PS059A
	1.5 Tons	2 Tons	3 Tons	4 Tons	5 Tons
Circulating Fluid—Water					
Coolant Flow Rate - GPM (L/M)	2.5 (9.6)	3.7 (13.8)	5.1 (19.2)	7.9 (30.0)	8.3 (31.2)
Pressure Drop - PSI (kPa)	6.1 (42.1)	12.3 (84.6)	4.9 (33.5)	8.1 (55.6)	10.2 (70.2)
Net Cooling Capacity—BTUH (kW)					
45°F (7.2°C) LWT	12500 (3.7)	18300 (5.4)	25400 (7.4)	39800 (11.7)	41400 (12.1)
50°F (10.0°C) LWT	14000 (4.1)	20900 (6.1)	28100 (8.2)	43300 (12.7)	46700 (13.7)
55°F (12.8°C) LWT	15400 (4.5)	23400 (6.9)	30900 (9.0)	47000 (13.8)	51900 (15.2)
60°F (15.6°C) LWT	16700 (4.9)	26000 (7.6)	33900 (9.9)	51300 (15.0)	56700 (16.6)
Stainless Steel Pump - Hp (kW)	1.0 (.75)	1.0 (.75)	1.0 (.75)	1.5 (1.1)	1.5 (1.1)
Total Head Pressure - PSI (kPa)	39.9 (275.1)	39.4 (271.7)	39.0 (268.9)	39.9 (275.1)	39.6 (273.0)
Water Connection Size-In (mm)	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)
Fluid Volume - Gal. (Liter)	7.1 (26.9)	7.2 (27.3)	9.8 (37.1)	9.9 (37.5)	10.0 (37.9)
Circulating Fluid—40% Ethylene Glycol					
Coolant Flow Rate - GPM (L/M)	2.5 (9.6)	3.7 (13.8)	5.1 (19.2)	7.9 (30.0)	8.3 (31.2)
Pressure Drop - PSI (kPa)	8.7 (60.1)	17.2 (118.4)	6.7 (46.3)	11.1 (76.2)	14.0 (96.2)
Net Cooling Capacity—BTUH (kW)					
45°F (7.2°C) LWT	11500 (3.4)	18100 (5.3)	23000 (6.7)	36600 (10.7)	38000 (11.1)
50°F (10.0°C) LWT	13000 (3.8)	20100 (5.9)	25500 (7.5)	40300 (11.8)	41800 (12.2)
55°F (12.8°C) LWT	14500 (4.2)	23400 (6.9)	28100 (8.2)	44000 (12.9)	45700 (13.4)
60°F (15.6°C) LWT	15900 (4.7)	26100 (7.6)	30900 (9.0)	50400 (14.8)	52100 (15.3)
Stainless Steel Pump - Hp (kW)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.5 (1.1)	1.5 (1.1)
Total Head Pressure - PSI (kPa)	39.9 (275.1)	39.4 (271.7)	39.0 (268.9)	39.9 (275.1)	39.6 (273.0)
Water Connection Size	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)
Fluid Volume - Gal. (Liter)	7.1 (26.9)	7.2 (27.3)	9.8 (37.1)	9.9 (37.5)	10.0 (37.9)
Circulating Fluid—40% Propylene Glycol					
Coolant Flow Rate - GPM (L/M)	2.5 (9.6)	3.7 (13.8)	5.1 (19.2)	7.9 (30.0)	8.3 (31.2)
Pressure Drop - PSI (kPa)	10.8 (74.4)	21.0 (144.7)	8.1 (55.9)	13.2 (91.2)	16.6 (114.8)
Net Cooling Capacity—BTUH (kW)					
45°F (7.2°C) LWT	10800 (3.2)	17300 (5.1)	21700 (6.4)	34700 (10.2)	36200 (10.6)
50°F (10.0°C) LWT	12300 (3.6)	19400 (5.7)	24200 (7.1)	38300 (11.2)	40100 (11.7)
55°F (12.8°C) LWT	13900 (4.1)	21500 (6.3)	26800 (7.8)	42000 (12.3)	44100 (12.9)
60°F (15.6°C) LWT	15400 (4.5)	23900 (7.0)	26600 (8.7)	46100 (13.5)	48200 (14.1)
Stainless Steel Pump - Hp (kW)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.5 (1.1)	1.5 (1.1)
Total Head Pressure - PSI (kPa)	39.9 (275.1)	39.4 (271.7)	39.0 (268.9)	39.9 (275.1)	39.6 (273.0)
Water Connection Size	3/4 (19)	3/4 (19)	1 (25)	1 (25)	1 (25)
Fluid Volume - Gal. (Liter)	7.1 (26.9)	7.2 (27.3)	9.8 (37.1)	9.9 (37.5)	10.0 (37.9)

Dimensional Data

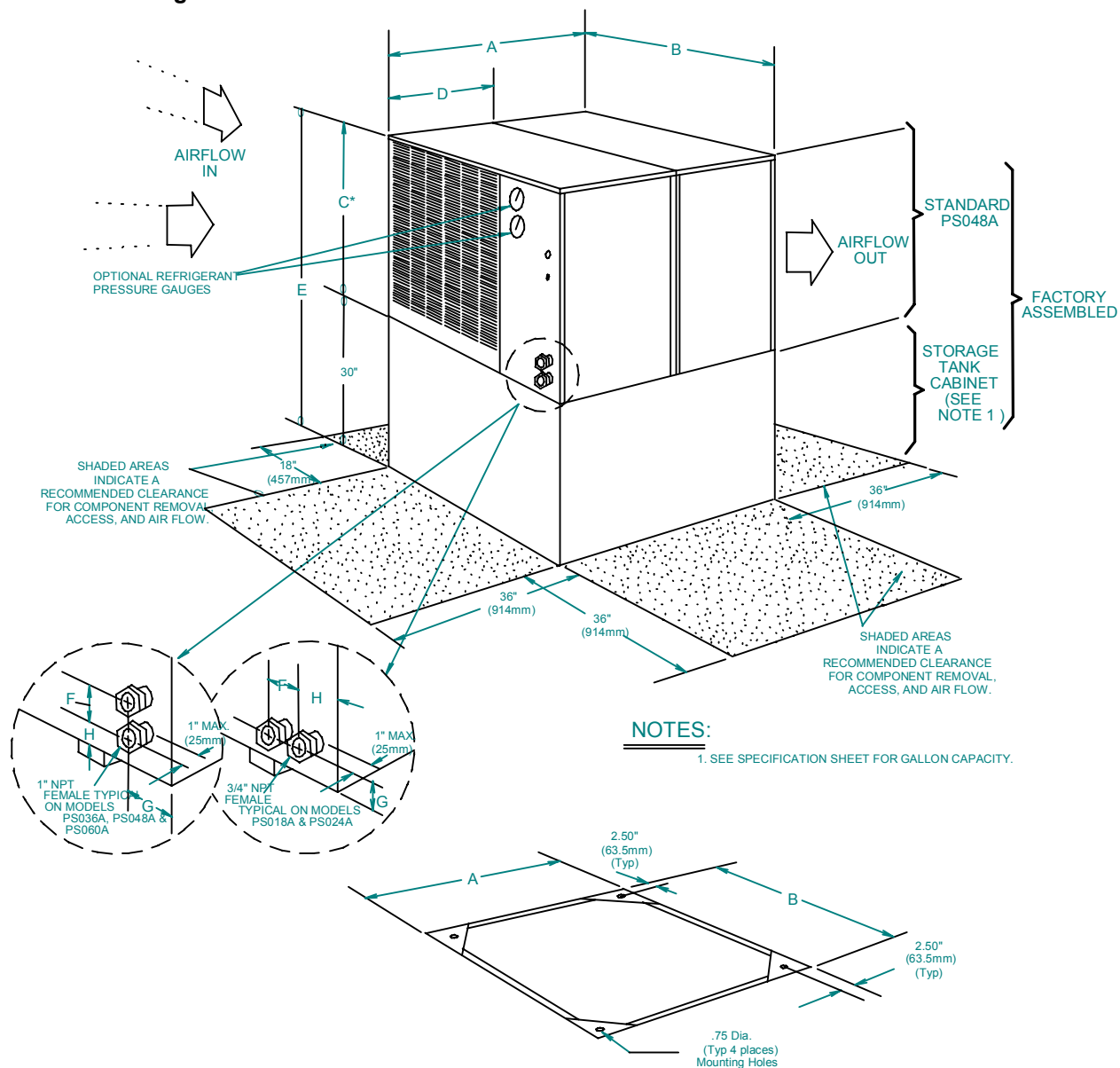
Figure 1 Cabinet size and floor planning dimensional data, 1.5 - 5 ton air cooled



Model Numbers		Dimensional Data In. (mm)											Weight (empty)
60 Hz	50 Hz	A	B	C	D	E	F	G	H	I	J	K	lb. (kg)
PS018A	PS021A	36 (914)	40-1/16 (1018)	25-1/4 (641)	18 (457)	N/A	27-7/32 (691)	2 (51)	1-3/8 (35)	2-1/4 (57)	8-27/32 (225)	1-15/16 (49)	314 (142)
PS024A	PS028A	36 (914)	40-1/16 (1018)	25-1/4 (641)	18 (457)	N/A	27-7/32 (691)	2 (51)	1-3/8 (35)	2-1/4 (57)	8-27/32 (225)	1-15/16 (49)	344 (156)
PS036A	PS038A	36-1/8 (918)	48-3/16 (1224)	32-1/2 (825)	18 (457)	N/A	34-3/32 (866)	1-7/8 (48)	2 (51)	2-1/2 (64)	10-3/32 (256)	2 (51)	425 (193)
PS048A	PS047A	36-1/8 (918)	53-3/16 (1351)	38-1/2 (978)	18 (457)	24-19/32 (625)	39-3/32 (993)	2-1/2 (64)	2 (51)	2-1/2 (64)	10-3/32 (256)	2 (51)	532 (241)
PS060A	PS059A	36-1/8 (918)	53-3/16 (1351)	38-1/2 (978)	18 (457)	24 19/32 (625)	39-3/32 (993)	2-1/2 (64)	2 (51)	2-1/2 (64)	10 3/32 (256)	2 (51)	582 (287)

* Note: C dimension includes 2" (51mm) tall rail.

Figure 2 Cabinet size and floor planning dimensional data, 1.5 - 5 ton air-cooled models with thermal storage tank



Model		Dimensional Data In. (mm)								Weight (empty**)	Tank Cap.
60 Hz	50 Hz	A	B	C	D	E	F	G	H	lb. (kg)	gal. (l)
PS018A	PS021A	36 (914)	40-1/16 (1018)	25-1/4 (641)	18 (457)	54-19/32 (1387)	2-1/4 (57)	2 (51)	1-3/8 (35)	614 (279)	N/A
PS024A	PS028A	36 (914)	40-1/16 (1018)	25-1/4 (641)	18 (457)	54-19/32 (1387)	2-1/4 (57)	2 (51)	1-3/8 (35)	644 (292)	N/A
PS036A	PS038A	36-1/8 (918)	48-3/16 (1224)	32-1/2 (825)	18 (457)	62-1/2 (1588)	2-1/2 (64)	1-7/8 (48)	2 (51)	725 (329)	N/A
PS048A	PS047A	36-1/8 (918)	53-3/16 (1351)	38-1/2 (978)	18 (457)	68-1/2 (1740)	2-1/2 (64)	2-1/2 (64)	2 (51)	832 (377)	50 (189)
PS060A	PS059A	36-1/8 (918)	53-3/16 (1351)	38-1/2 (978)	18 (457)	68-1/2 (1740)	2-1/2 (64)	2-1/2 (64)	2 (51)	882 (400)	50 (189)

* Note: C dimension includes 2" (51mm) tall rail.

** Note: Add weight of fluid for operating weight.

[illegible]

Model Numbers	Dimensional Data in (mm)				Module Weight (empty) lbs. (kg.) net
60 Hz	A	B	C	D	
PS096A	77	39-1/4	38-1/2	5-1/2	750
PS120A	(1956)	(997)	(978)	(140)	(340)

Figure 4 Cabinet and floor planning dimensional data, 8-10 ton air cooled with thermal storage tank cabinet

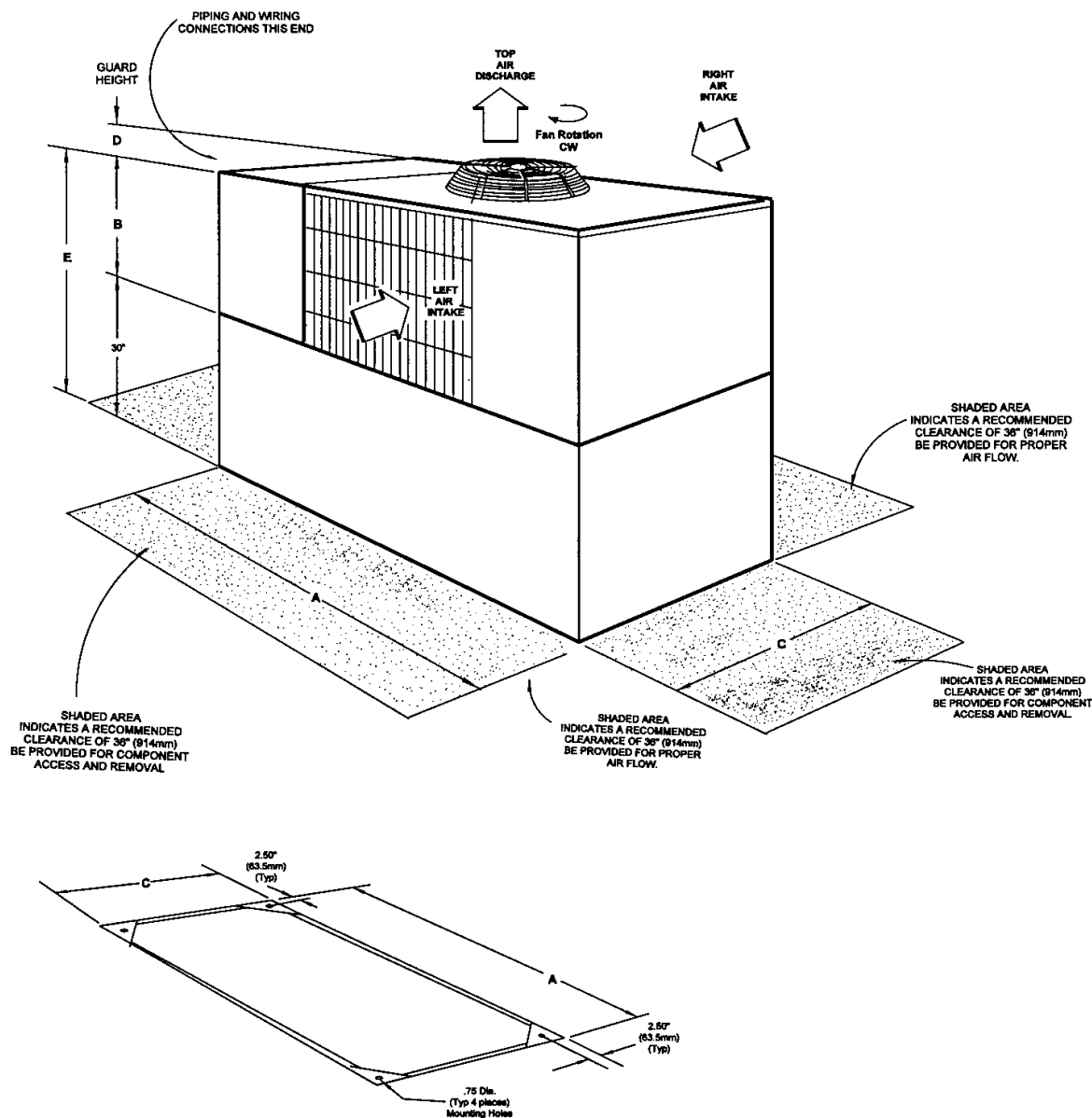


Table 5 Dimensional data, 8-10 ton air-cooled models with thermal storage tank cabinet

Model Numbers	Dimensional Data in (mm)					Module Weight (empty*) lbs (kg)	Storage Tank Capacity gal (L)
	A	B	C	D	E		
60 Hz							
PS096A	77	39-1/4	38-1/2	5-1/2	69-1/4	1170 (531)	100 (380)
PS120A	(1956)	(997)	(978)	(140)	(1759)		

* Note: Add weight of fluid for operating weight

Figure 5 General piping arrangement, 1.5 to 5 ton, air cooled

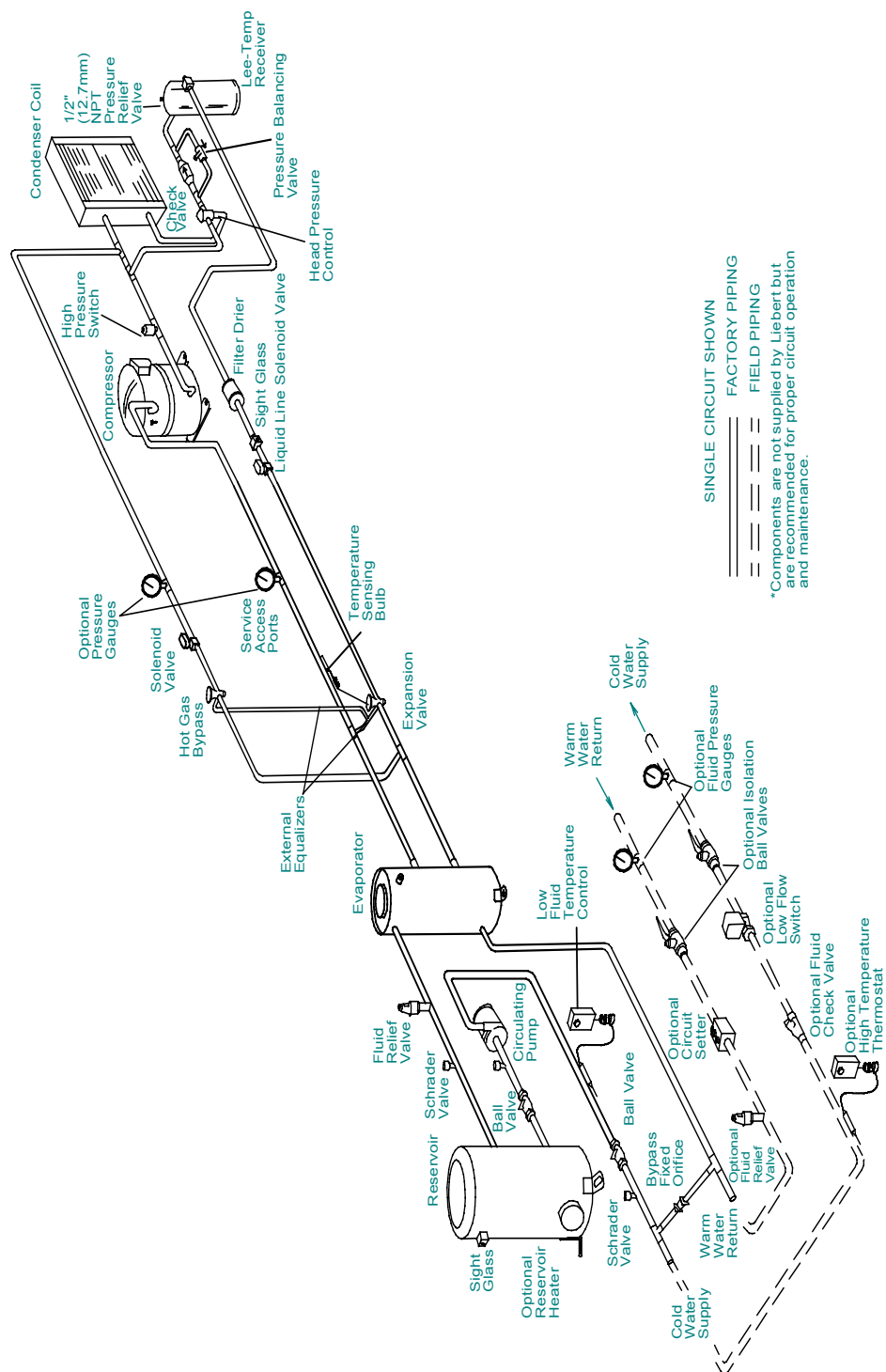
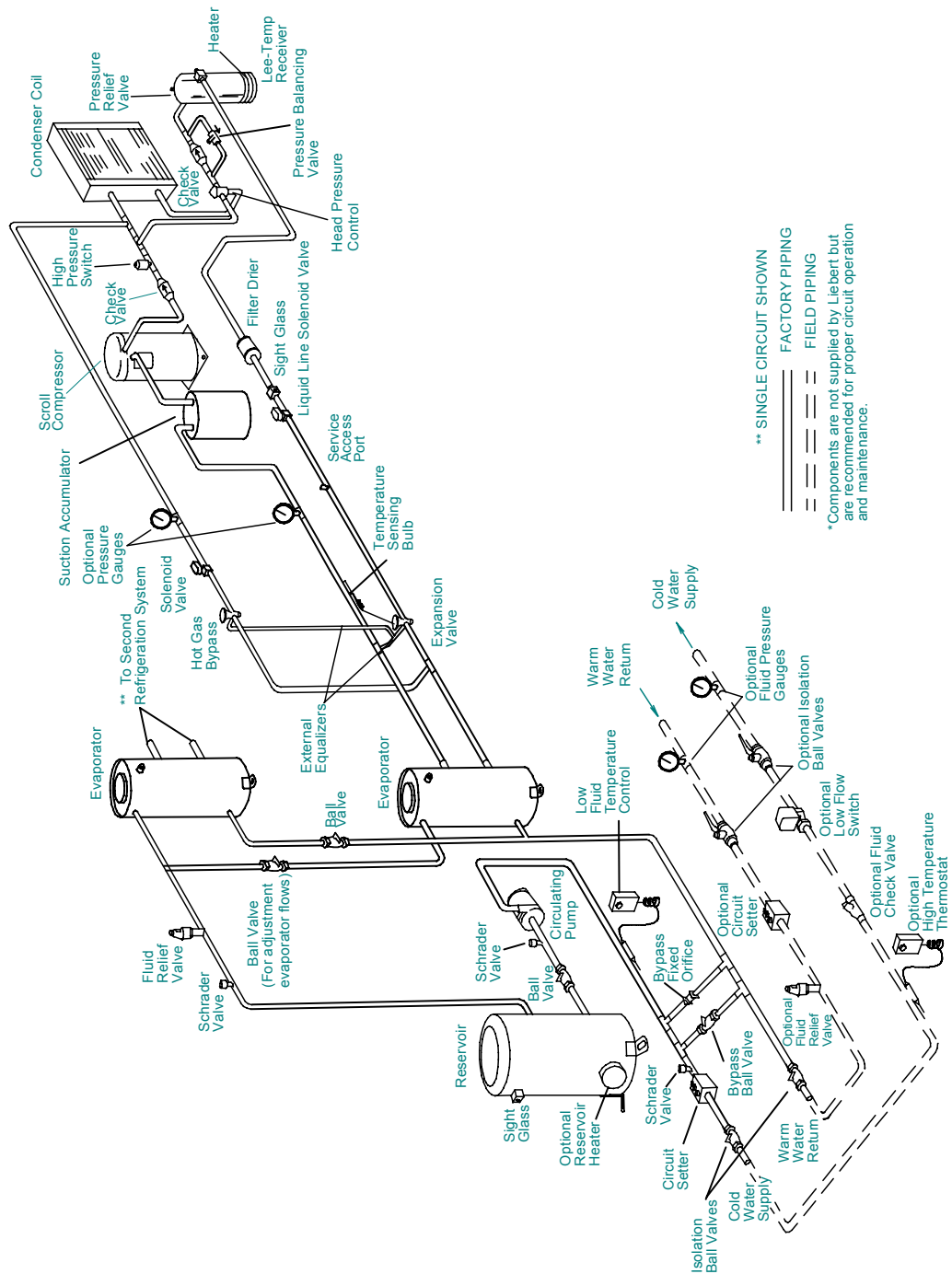
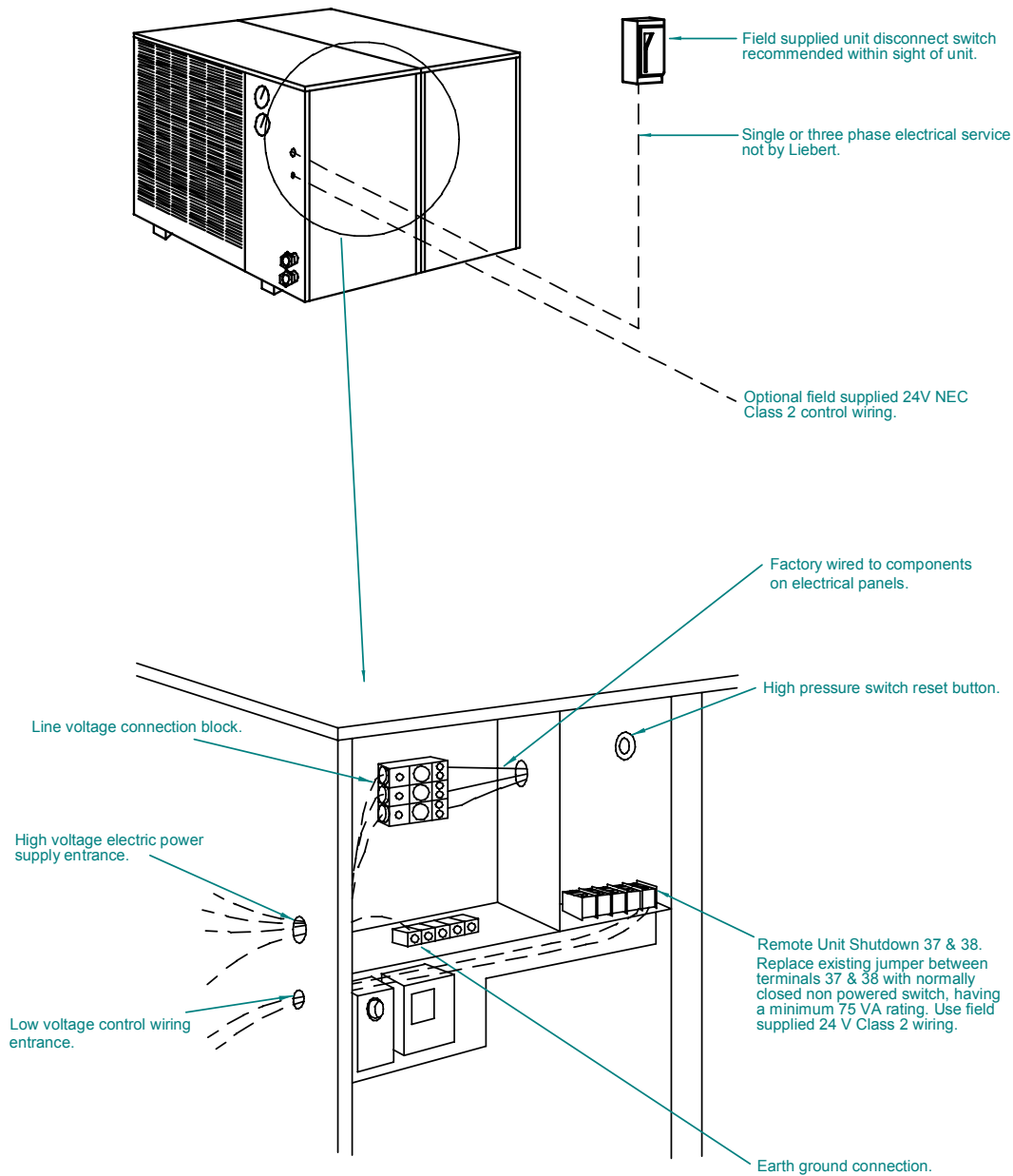


Figure 6 General piping arrangement, 8 to 10 ton, air cooled



Electrical Field Connections

Figure 7 Electrical field connections, 1.5 - 5 ton air cooled



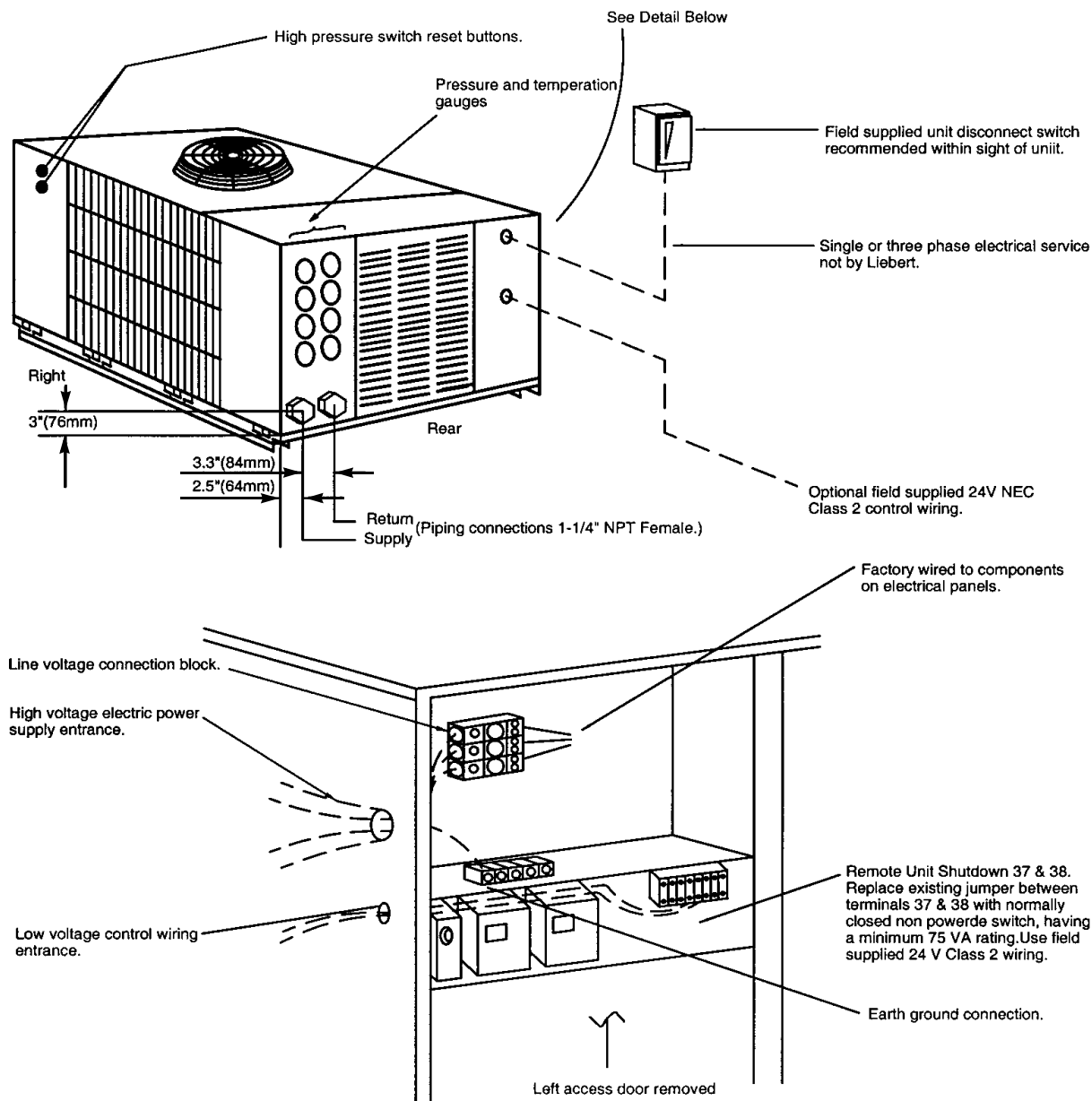
NOTE: Refer to specification sheet for full load amp. and wire size amp. ratings.



WARNING

Potentially lethal voltages exist within this equipment during operation. Observe all cautions and warnings on unit and in this manual. Failure to do so could result in serious injury or death. Only qualified service and maintenance personnel should work with this equipment.

Figure 8 Electrical field connections, 8-10 ton air cooled



NOTE: Refer to specification sheet for full load amp. and wire size amp. ratings.



WARNING

Potentially lethal voltages exist within this equipment during operation. Observe all cautions and warnings on unit and in this manual. Failure to do so could result in serious injury or death. Only qualified service and maintenance personnel should work with this equipment.

Electrical Data

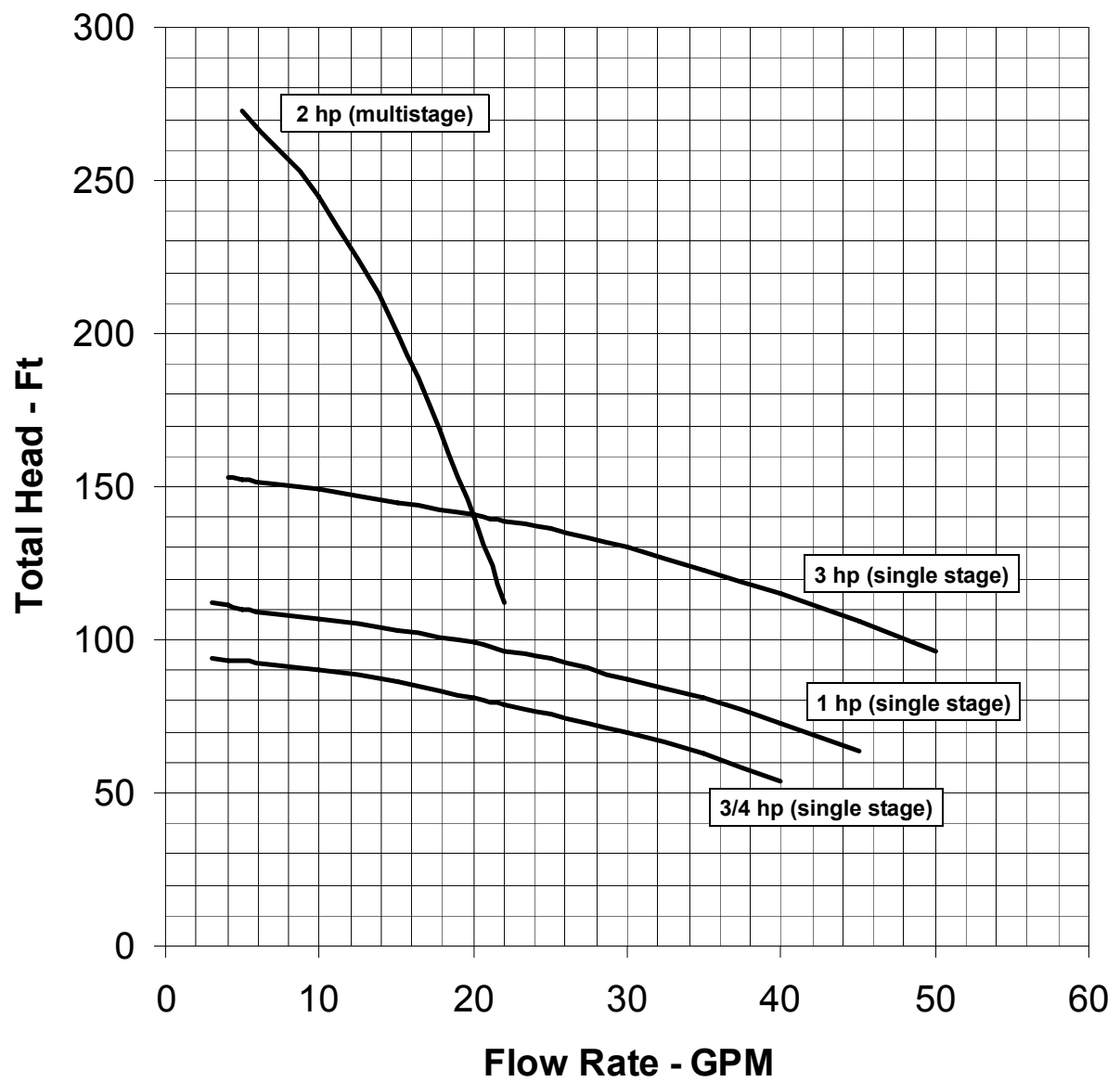
Table 6 Electrical data—60Hz

Tons	Model	Voltage	Stainless Steel Pump (Standard)					
			With Heater			Without Heater		
			FLA	WSA	OPD	FLA	WSA	OPD
1-1/2	PS018A	208/230, 1 Phase	16.7	19.1	25	15.7	18.1	25
2	PS024A	208/230, 1 Phase	18.0	20.7	30	17.0	19.7	30
3	PS036A	208/230, 1 Phase	22.6	26.5	40	21.7	25.6	40
	PS036A	208/230, 3 Phase	15.9	18.6	25	14.9	17.6	25
	PS036A	460, 3 Phase	8.6	10.1	15	8.0	9.5	15
4	PS048A	208/230, 3 Phase	21.1	24.5	35	20.1	23.5	35
	PS048A	460, 3 Phase	11.3	13.2	20	10.7	12.6	20
5	PS060A	208/230, 3 Phase	26.8	31.6	50	25.8	30.6	45
	PS060A	460, 3 Phase	12.6	14.8	20	12.0	14.2	20
8	PS096A	208/230, 3 Phase	38.6	42.0	50	37.6	41.0	50
	PS096A	460, 3 Phase	20.4	22.3	30	19.8	21.7	25
10	PS120A	208/230, 3 Phase	49.3	53.6	70	48.3	52.6	70
	PS120A	460, 3 Phase	25.0	27.7	35	24.4	26.7	35

Table 7 Electrical data—50Hz

Tons	Model	Voltage	Stainless Steel Pump (Standard)			
			With Heater		Without Heater	
			FLA	WSA	FLA	WSA
1-1/2	PS021A	200/230, 1 Phase	21.8	24.7	20.8	23.7
2	PS028A	200/230, 1 Phase	26.8	30.9	25.8	29.9
3	PS038A	200/230, 1 Phase	29.5	34.3	28.5	33.3
	PS038A	200/230, 3 Phase	20.6	24.2	19.6	23.2
	PS038A	380/420, 3 Phase	9.9	11.6	9.3	11.0
4	PS047A	200/230, 3 Phase	29.3	34.1	28.3	33.1
	PS047A	380/420, 3 Phase	15.0	17.5	14.4	16.9
5	PS059A	200/230, 3 Phase	31.4	36.8	30.4	35.8
	PS059A	380/420, 3 Phase	14.6	17.0	14.0	16.4

Figure 9 Process chiller pump performance—60Hz



Accessories

Figure 10 Emergency water switchover—optional

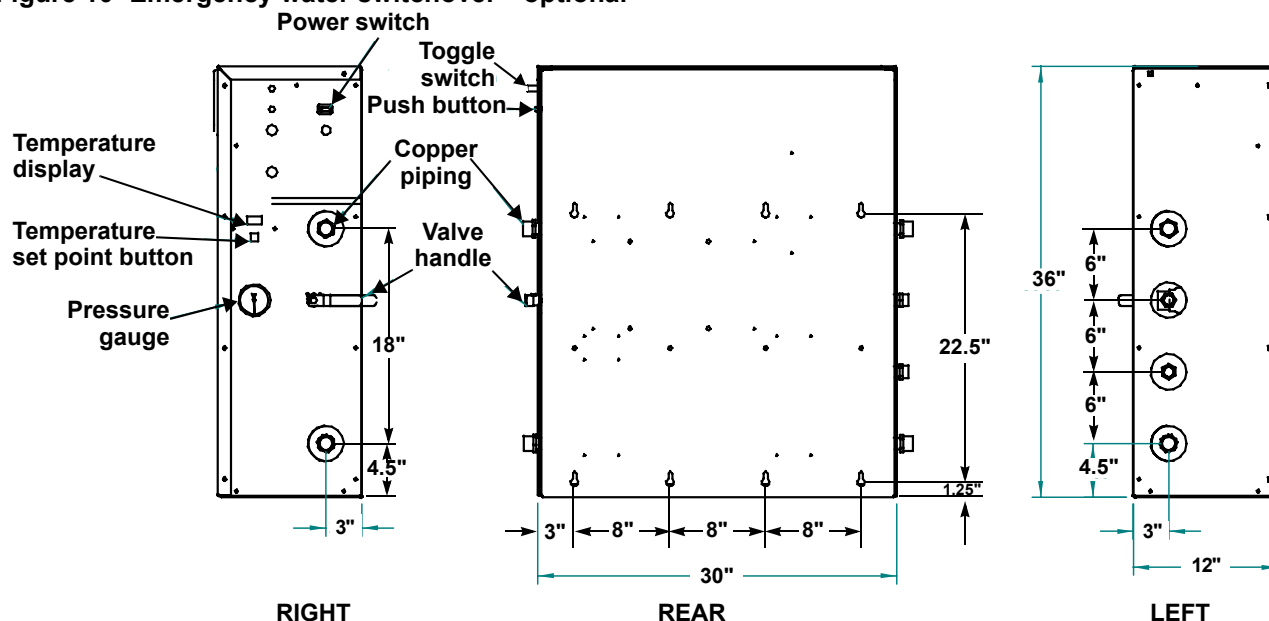


Table 8 Emergency water switchover (EWS) Data

EWS Model Number	EWS05	EWS10	EWS20
Nominal Flow Rate - GPM (l/m)	5 (19)	10 (38)	20 (76)
Pressure Drop - Ft of water (kPa)	8.0 (23)	14.0 (41)	15.2 (44.5)
Minimum Flow Setting (adj) - GPM (l/m)	1.5 (5.7)	4.2 (16.0)	5.8 (22.0)
Maximum System Pressure - PSI (kPa)	100 (125)	100 (125)	100 (689)
Connections	NPT male	NPT male	NPT male
A Supply from Chiller	3/4"	1"	1-1/4"
B From Emergency Water Source	3/4"	3/4"	3/4"
C To Open Drain	3/4"	3/4"	3/4"
D Return to Chiller	3/4"	1"	1-1/4"
E Supply to Load	3/4"	1"	1-1/4"
F Return from load	3/4"	1"	1-1/4"



NOTE

1. EWS is not for use with glycol systems.
2. The drain line must be piped to an open drain for the valve to operate properly.
3. Water pressure required must be greater than the sum of the EWS pressure drop, piping pressure drop, and load pressure drop

Table 9 EWS electrical data—EWS05, EWS10 and EWS20

Input Voltage	120V / 60 Hz	220V / 50 Hz
Input Amps	0.6A	0.8A
Maximum Supply Circuit Ampacity	0.7A	1.0A
Maximum Fuse or Circuit Breaker Size	15A	15A

Table 10 Clearance requirements

Top: 24"
Left: 12"
Right: 24"
Front: 36"

Figure 11 Wall-mounted monitoring box—optional

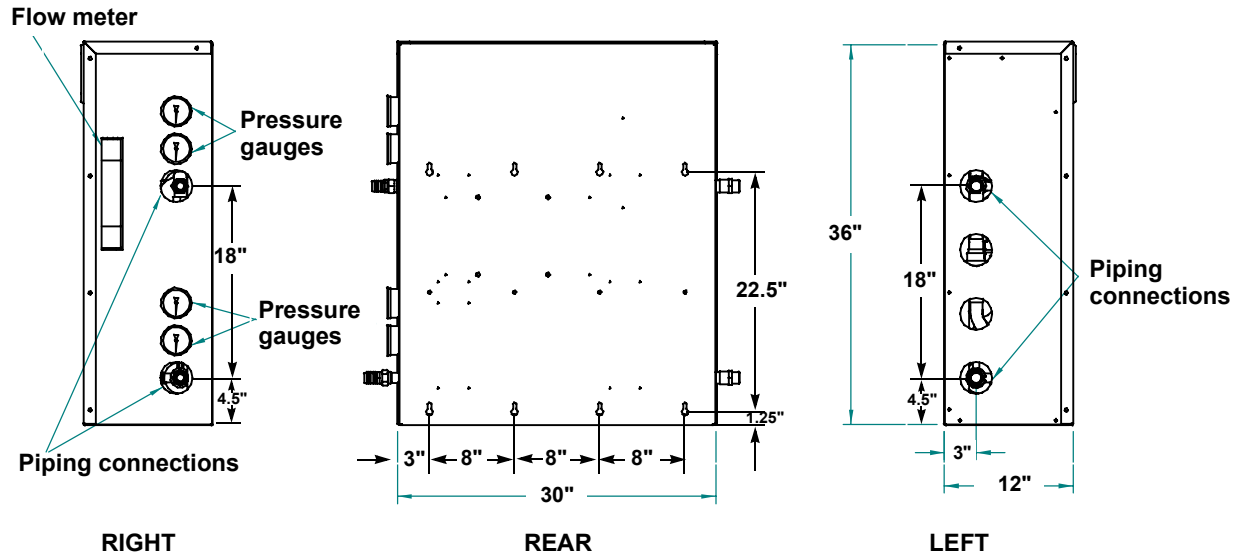


Table 11 Wall-mounted monitoring box specifications

Flowmeter Range	2-22 gpm
Water Filter (max flow = 30 gpm)	100 microns
Nominal Flow Rating	15 gpm (57 l/m)
Pressure Drop @ 15 gpm (57 l/m)	19.6 ft (59 kPa)
Pressure Gauge Range	0-150 psi
Temperature Gauge Range	30-160°F
Connections to Chiller	3/4" NPT
Connections to Load	1" hose barb

Table 12 Clearance requirements

Top: 24"
Left: 12"
Right: 24"
Front: 36"

Figure 12 Internal piping diagram of wall-mounted monitoring box

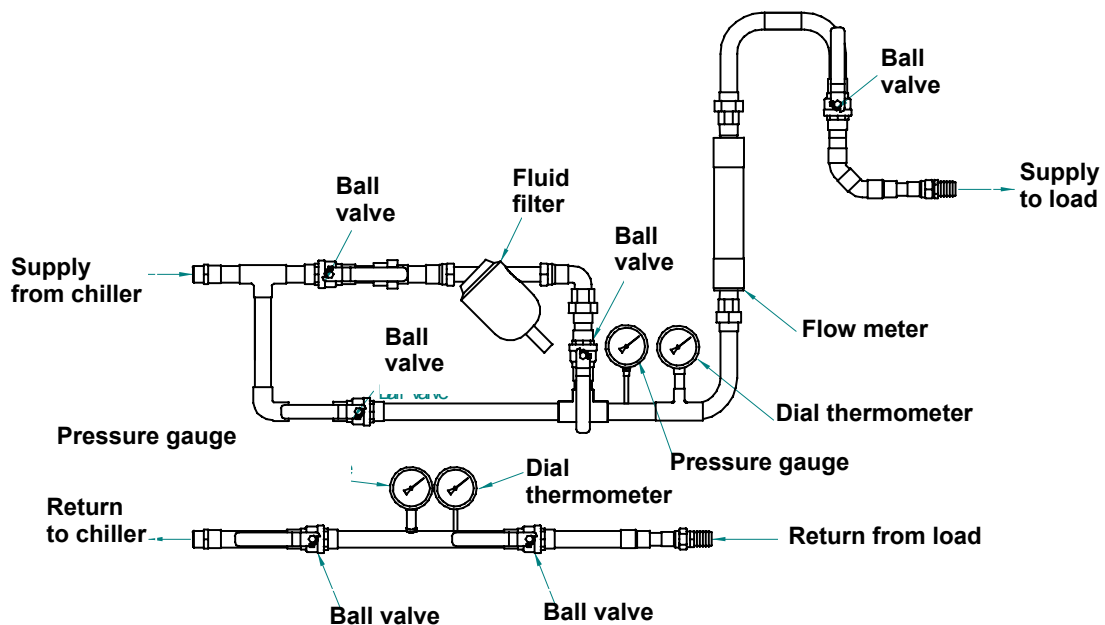


Figure 13 Water level control module—optional

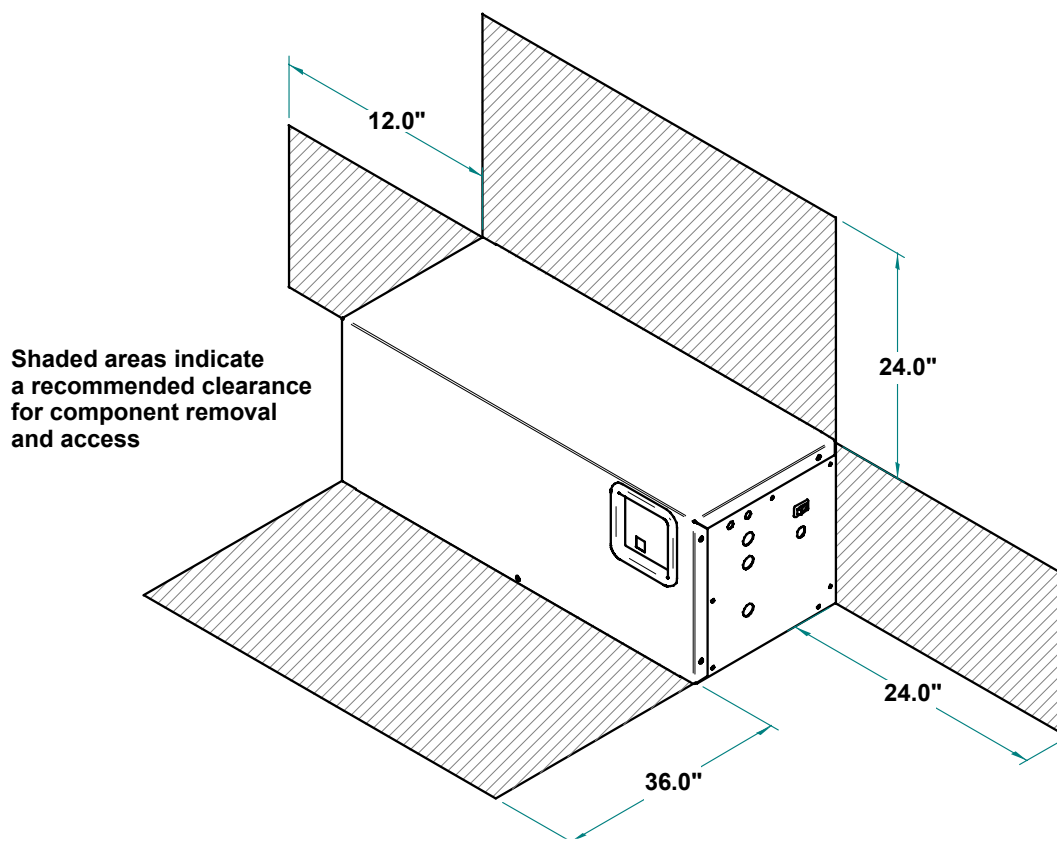
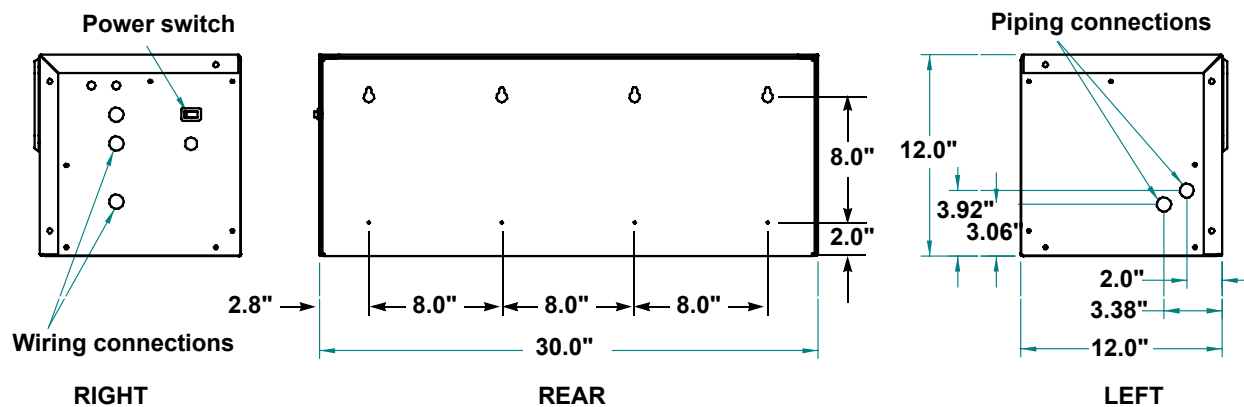
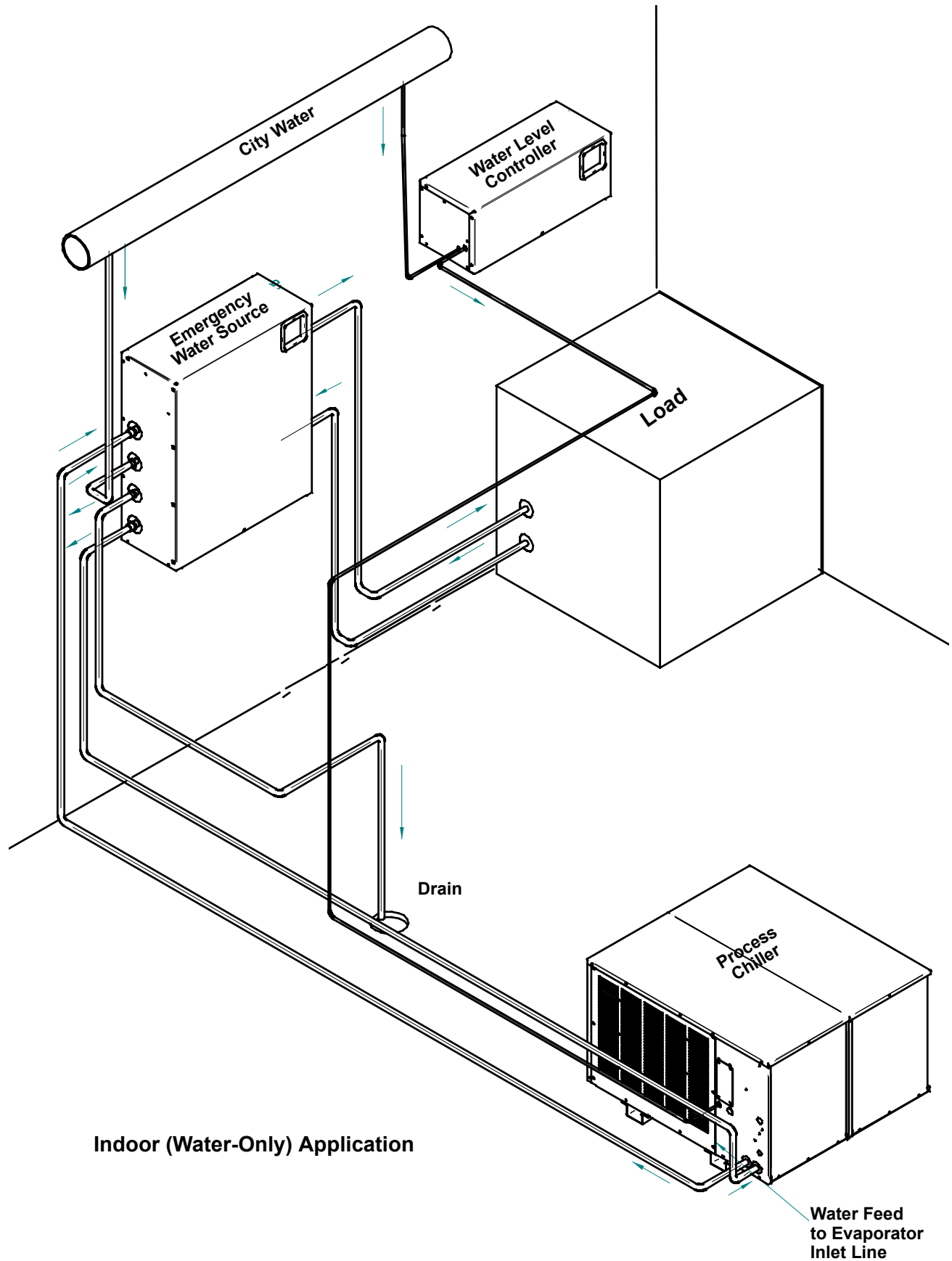


Table 13 Water level control module electrical data

Input Voltage	115V (60Hz)	220V (50 Hz)
Input Amps	0.5A	0.4A
Maximum Supply Circuit Ampacity	0.6A	0.5A
Maximum Fuse or Circuit Breaker Size	15A	15A

Figure 14 Typical piping arrangement using optional emergency water switchover and water level control



CHILLER SELECTION FORM

Gathering and providing the information on this form will help determine the chiller and options needed to provide satisfactory performance. Fill out the form and send to a local Liebert representative.

	Manufacturer/Model # of equipment
	Maximum load - BTU/hr
	Minimum load - BTU/hr
Yes / No	Load step-change?
to	Flow rate range - GPM
	Desired flow rate - GPM
to	Min/Max leaving water temperature - °F
	Desired leaving water temperature - °F
	Pressure drop through load - PSI
	Maximum rate of change (temperature) - °F/minute
%	Fluid type, % concentration
Yes / No	Non-ferrous loop required?
	Estimated system volume - Gallons
	Design ambient - °F
	Elevation - Feet above sea level

ADDITIONAL COMMENTS:

[illegible]

GUIDE SPECIFICATIONS, 1.5 TO 10 TON PROCESS FLUID CHILLER

1.0 GENERAL

1.1 Summary

These specifications describe requirements for a self-contained air-cooled process fluid chiller system.

1.2 Design Requirements

The chiller shall be a Liebert model_____, self-contained air-cooled chiller system. Each system shall have a net cooling capacity of_____BTU/HR (kW), based on a leaving coolant fluid temperature of_____°F (°C), and 95°F ambient air temperature. The cooling fluid shall be_____% propylene glycol, ethylene glycol, or water. Unit is to be supplied with _____volts, _____ph, _____Hz power supply.

1.3 Submittals

Submittals shall be provided with the proposal and shall include: Single-line Diagrams; Dimensional, electrical, and capacity data; Piping and Electrical Connection Drawings.

2.0 PRODUCT

2.1 Cabinet and Frame Construction

The cabinet and chassis shall be constructed of painted weatherized steel. Removable access panels shall open to a second cover that protects all line voltage components. Service access shall be provided on two sides.

2.2 Coolant Delivery System

The chiller shall have a factory installed close-coupled centrifugal pump with a ball bearing motor designed for continuous duty. The circulating pump shall be_____HP and shall have a 304 stainless steel housing and impeller. The pump shall provide____GPM (l/m) at____feet

of water (kPa) total head. The internal coolant delivery system shall include isolating ball valves on each side of the pump, stainless steel thermal storage reservoir with sight glass, pressure relief valve and optional heater. The system shall also include Schrader valve fittings on each side of the pump and on each side of the thermal storage reservoir, and a fixed orifice bypass to prevent pump “dead heading”. Internal chilled water piping shall be factory insulated.

2.3 Refrigeration System

The refrigeration system shall be direct expansion with fully insulated shell and coil evaporator. The system shall include service ports, liquid line filter dryer, refrigerant sight glass and moisture indicator. The system shall also include an adjustable, externally equalized expansion valve, liquid line solenoid valve, and an adjustable hot gas bypass with a solenoid valve for compressor capacity control. The internal condensing unit shall be factory tested and charged with refrigerant (R-22) and shall include a direct-drive propeller-type fan. The condenser coil shall be constructed of copper tubes and aluminum fins. The winter control system shall be a Liebert “Lee-Temp” system to allow start-up and positive head pressure control with ambient temperatures as low as -30°F (-34.4°C). The Lee-Temp package shall include insulated receiver, pressure relief valve, check valve, and head pressure three-way control valve. No piping, brazing, dehydration or charging of the refrigeration system shall be required.

2.4 Compressor

The unit shall have a (hermetic) (scroll) compressor(s) with suction gas cooled motor, vibration

isolators, thermal overloads, crankcase heater, and shall operate at 3500 RPM @ 60 Hz.

2.5 Control System

The control system shall consist of a fluid temperature control, refrigerant pump down low pressure switch, manual reset high pressure switch, low ambient start relay, compressor anti-recycle relay set for three minutes, 24 volt transformer with circuit breaker, and remote shut down terminals for unit shutdown via a maintained NC contact. The line voltage system shall include pump contactor, pump overload relay, compressor/fan contractors, and starters.

3.0 OPTIONAL EQUIPMENT

3.1 Refrigerant Gauges and Reservoir Heater

The refrigerant gauges and reservoir heater shall be factory installed. The reservoir heater shall maintain minimum fluid temperature during low ambient conditions and shall be a 250-watt, copper sheath/stainless steel plug insertion type heater with integral adjustable thermostat for the fluid reservoir. The adjustable thermostat shall be set to turn on at 35°F (1.7°C) and turn off at 42°F (5.6°C). The suction and discharge refrigerant gauges shall be 2 ½ inches (63.5 mm) in diameter, hermetically sealed, with stainless steel bourdon tube and stainless steel housing.

3.2 Multistage Pump (option on 8- and 10-ton models)

Chiller shall include a 6-stage 2 Hp pump capable of delivering _____GPM at _____Ft. of Total Head.

3.3 Storage Tank

System shall include a ____ gallon stainless-steel storage tank, factory piped, and installed beneath the chiller cabinet.

4.0 ACCESSORIES

4.1 Emergency Water Switchover Module

This module shall automatically switch to emergency (city) water on either a high fluid temperature alarm or loss of fluid flow alarm. This module shall be a pre-piped and wired assembly that consists of an enclosure, RCM4 monitor, on/off switch, 24 VAC control transformer protected by a circuit breaker, non-powered alarm contacts, auto/manual override switch, reset switch, time delays, flow switch, and high temperature thermostat. The system shall also include two ball valves, two three way solenoid valves, double check backflow preventer, circuit setter on the drain line, a fluid pressure gauge and valve, and a dial thermometer on the entering fluid line. It shall require a 120 VAC, 60 Hz, single phase power input.

Note: This module must not be used on systems that circulate glycol as the cooling medium.

4.2 Water Level Control and Alarm System

The chiller shall have a water level control and alarm system that shall automatically add water to the thermal storage reservoir when the water level drops below a preset level. An alarm circuit shall activate if the tank has not filled after a preset time period of four minutes, and a lock out circuit shall de-energize the solenoid valve with integral strainer, double check backflow preventer, flow regulating valve, automatic air vent, and time delay relays.

The module shall also include a pre-wired RCM4 monitor with a

local display for high fluid level, low fluid level, fluid fill and fluid fill lockout, and separate non-powered contacts for high fluid level, low fluid level, and fluid fill, and non-powered common alarm contacts. The system shall be field installed. It shall require 120 VAC, 60 Hz, single-phase power input.

4.3 Fluid Pressure Gauge

A quantity of ____ 2½ in. (63.5 mm) dial gauges, suitable for field panel mounting for supply and/or return pressure measurement shall be provided. The gauge shall have a scale from 0 to 100 PSIG (0 to 690 kPa), and black painted steel housing, and a bourdon tube for monitoring pressure.

4.4 Check Valve

A brass body and swing check valve shall be provided for field installation in the fluid piping to prevent backflow.

4.5 Dial Thermometer

A quantity of ____ 2 ½ in. (63.5 mm) dial thermometers, suitable for field panel mounting for supply and/or return fluid temperature measurement shall be provided. The thermometers shall have a dual scale from 20°F to 120°F and have -6.7°C to 54.4°C.

4.6 Relief Valve

A brass body valve preset at 50 PSI (344 kPa) shall be provided for field installation in the fluid piping.

4.7 Circuit Setter

A bronze body, calibrated balancing valve for flow balance, metering, and shutoff shall be provided for field installation.

4.8 Ball Valve

A quantity of ____ brass body, ¼ turn ball valves for isolation of fluid piping components and serviceability shall be provided for field installation.

4.9 High Temperature Thermostat

A remote bulb adjustable thermostat with an adjustable range from 40°F to 90°F (4.4°C to 32.3°C) shall be provided for field installation. The thermostat shall provide a non-powered alarm contact when the fluid temperature rises above design limit.

4.10 Low Flow Switch

A brass body flow switch shall be provided for field installation to provide a non-powered alarm contact when fluid flow falls below design limit.

4.11 Wall-Mounted Monitoring Box

A wall-mounted monitoring box shall be provided. The box shall include a flowmeter, 100 micron filter, four (4) ball valves, supply and return temperature gauges, and supply and return pressure gauges.

5.0 EXECUTION

5.1 Installation of Process Fluid Chiller

5.1.1 General

Install process fluid chiller in accordance with the manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated and maintain manufacturer's recommended clearances.

5.1.2 Electrical Wiring

Install and connect electrical devices furnished by manufacturer but specified to be field installed. Furnish copy of manufacturer's electrical connection diagram to electrical contractor.

5.1.3 Field Quality Control

Start up process fluid chiller units in accordance with manufacturer's start up instructions. Test controls and demonstrate compliance with requirements.

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